Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims:

Claims 1-33 (Canceled)

34. (Currently Amended) The mass flow controller of claim ~~33~~ 45, wherein the at least one pressure transducer measures an inlet pressure of the flow path and provides an inlet pressure signal.

Claims 35-36 (Canceled)

37. (Currently Amended) The mass flow controller of claim ~~36~~ 39, wherein the compensation filter has a transfer function that emulates a response of the flow sensor to fluid flow resulting from changes ~~in~~ of the inlet pressure.

38. (Currently Amended) The mass flow controller of claim ~~36~~ 39, wherein the false flow signal is constructed to recreate a false flow information component of the sensor output signal resulting from changes ~~in~~ of the inlet pressure.

39. (Currently Amended) A ~~The~~ mass flow controller ~~of claim 36,~~ having a control loop, the mass flow controller comprising:

a flow meter adapted to sense fluid flow in a fluid flow path and provide a flow signal indicative of the mass flow rate in the flow path;

a controller coupled to the flow meter and adapted to provide a drive signal based at least in part on the flow signal;

a valve actuator adapted to receive the drive signal from the controller;

a valve adapted to be controlled by the valve actuator and coupled to the fluid flow path;

at least one pressure transducer to measure at least one pressure in a mass flow controller environment and to provide at least one pressure signal indicative of measurement of the at least one pressure; and

at least one compensation means to receive the at least one pressure signal and to provide at least one compensation signal to the control loop to compensate for effects of pressure changes in the mass flow controller environment, wherein the control loop of the mass flow controller includes the flow meter, the controller, the valve actuator, and the valve;

wherein the at least one pressure transducer measures an inlet pressure of the flow path and provides an inlet pressure signal;

wherein the at least one compensation means includes a compensation filter to receive the inlet pressure signal and to construct a false flow signal from the inlet pressure signal;

wherein the flow meter includes a flow sensor adapted to sense fluid flow in the flow path and adapted to provide a sensor output signal indicative of the sensed fluid flow; and

wherein the flow signal is determined by subtracting the false flow signal from the sensor output signal.

40. (Currently Amended) A ~~The~~ mass flow controller ~~of claim 34,~~ having a control loop, the mass flow controller comprising:

a flow meter adapted to sense fluid flow in a fluid flow path and provide a flow signal indicative of the mass flow rate in the flow path;

a controller coupled to the flow meter and adapted to provide a drive signal based at least in part on the flow signal;

a valve actuator adapted to receive the drive signal from the controller;

a valve adapted to be controlled by the valve actuator and coupled to the fluid flow path;

at least one pressure transducer to measure at least one pressure in a mass flow controller environment and to provide at least one pressure signal indicative of measurement of the at least one pressure; and

at least one compensation means to receive the at least one pressure signal and to provide at least one compensation signal to the control loop to compensate for effects of pressure

changes in the mass flow controller environment, wherein the control loop of the mass flow controller includes the flow meter, the controller, the valve actuator, and the valve;

wherein the at least one pressure transducer measures an inlet pressure of the flow path and provides an inlet pressure signal; and

wherein the at least one compensation means includes displacement compensation means that receives the inlet pressure signal and provides a displacement compensation signal indicative of a drive level to maintain a controlled portion of the valve substantially motionless in a pressure environment of the valve.

41. (Original) The mass flow controller of claim 40, wherein the displacement compensation signal is added to the drive signal to compensate for valve displacement resulting from pressure gradients in the pressure environment of the valve.

42. (Original) The mass flow controller of claim 40, wherein the displacement compensation signal is based in part on a force model of the valve.

43. (Original) The mass flow controller of claim 42, wherein the force model of the valve includes a magnetic model of the valve.

44. (Original) The mass flow controller of claim 42, wherein the force model of the valve includes a parameter for at least one pressure drop across the valve.

45. (Currently Amended) A ~~The~~ mass flow controller ~~of claim 33,~~ having a control loop, the mass flow controller comprising:

a flow meter adapted to sense fluid flow in a fluid flow path and provide a flow signal indicative of the mass flow rate in the flow path;

a controller coupled to the flow meter and adapted to provide a drive signal based at least in part on the flow signal;

a valve actuator adapted to receive the drive signal from the controller;

a valve adapted to be controlled by the valve actuator and coupled to the fluid flow path;

at least one pressure transducer to measure at least one pressure in a mass flow controller environment and to provide at least one pressure signal indicative of measurement of the at least one pressure; and

at least one compensation means to receive the at least one pressure signal and to provide at least one compensation signal to the control loop to compensate for effects of pressure changes in the mass flow controller environment, wherein the control loop of the mass flow controller includes the flow meter, the controller, the valve actuator, and the valve;

wherein the at least one compensation means includes a compensation filter to receive the at least one pressure signal and provide a false flow signal constructed to recreate false flow information resulting from the flow meter responding to pressure transients and displacement compensation means to receive the at least one pressure signal and provide a displacement compensation signal indicative of a drive level to compensate for displacement of the valve caused by the pressure transients.

Claims 46-64 (Canceled)

65. (Currently Amended) A ~~The~~ mass flow controller ~~of claim 36,~~ having a control loop, the mass flow controller comprising:

a flow meter adapted to sense fluid flow in a fluid flow path and provide a flow signal indicative of the mass flow rate in the flow path;

a controller coupled to the flow meter and adapted to provide a drive signal based at least in part on the flow signal;

a valve actuator adapted to receive the drive signal from the controller;

a valve adapted to be controlled by the valve actuator and coupled to the fluid flow path;

at least one pressure transducer to measure at least one pressure in a mass flow controller environment and to provide at least one pressure signal indicative of measurement of the at least one pressure; and

at least one compensation means to receive the at least one pressure signal and to provide at least one compensation signal to the control loop to compensate for effects of pressure

changes in the mass flow controller environment, wherein the control loop of the mass flow controller includes the flow meter, the controller, the valve actuator, and the valve;

wherein the at least one pressure transducer measures an inlet pressure of the flow path and provides an inlet pressure signal;

wherein the at least one compensation means includes a compensation filter to receive the inlet pressure signal and to construct a false flow signal from the inlet pressure signal;

wherein the flow meter includes a flow sensor adapted to sense fluid flow in the flow path and adapted to provide a sensor output signal indicative of the sensed fluid flow; and

wherein the compensation filter includes a delay block that delays the inlet pressure signal to be substantially aligned in time with a response of the flow sensor to the pressure changes in the mass flow controller environment, and wherein the delay block provides ~~at least one~~ a delayed pressure signal.

66. (Currently Amended) The mass flow ~~meter~~ controller of claim 65, wherein the compensation filter includes a differentiator to receive the delayed pressure signal, the differentiator being adapted to determine a derivative of the delayed pressure signal and provide a derivative signal.

67. (New) The mass flow controller of claim 66, wherein the compensation filter further includes a plurality of second order filters connected in series, the plurality of second order filters including a first second order filter to receive the derivative signal and provide a filtered derivative signal to a next second order filter in the series.

68. (New) The mass flow controller of claim 67, wherein the compensation filter further includes a plurality of gain blocks to receive the filtered derivative signal from each of the plurality of second order filters and scale the filtered derivative signal provided by each of the plurality of second order filters.

69. (New) The mass flow controller of claim 68, wherein the compensation filter further includes an adder to sum each scaled and filtered derivative signal provided by each of the plurality of gain blocks and provide the false flow signal.

70. (New) The mass flow controller of claim 69, wherein the flow signal is determined by subtracting the false flow signal from the sensor output signal.

71. (New) The mass flow controller of claim 39, wherein the compensation filter includes a delay block that delays the inlet pressure signal to be substantially aligned in time with a response of the flow sensor to the pressure changes in the mass flow controller environment, and wherein the delay block provides a delayed pressure signal.

72. (New) The mass flow controller of claim 71, wherein the compensation filter includes a differentiator to receive the delayed pressure signal, the differentiator being adapted to determine a derivative of the delayed pressure signal and provide a derivative signal.

73. (New) The mass flow controller of claim 72, wherein the compensation filter further includes a plurality of second order filters connected in series, the plurality of second order filters including a first second order filter to receive the derivative signal and provide a filtered derivative signal to a next second order filter in the series.

74. (New) The mass flow controller of claim 73, wherein the compensation filter further includes a plurality of gain blocks to receive the filtered derivative signal from each of the plurality of second order filters and scale the filtered derivative signal provided by each of the plurality of second order filters.

75. (New) The mass flow controller of claim 39, wherein the at least one compensation means includes displacement compensation means that receives the inlet pressure signal and provides a displacement compensation signal indicative of a drive level to maintain a controlled portion of the valve substantially motionless in a pressure environment of the valve.

76. (New) The mass flow controller of claim 75, wherein the displacement compensation signal is added to the drive signal to compensate for valve displacement resulting from pressure gradients in the pressure environment of the valve.

77. (New) The mass flow controller of claim 75, wherein the displacement compensation signal is based in part on a force model of the valve.

78. (New) The mass flow controller of claim 40, wherein the at least one compensation means includes a compensation filter to receive the inlet pressure signal and to construct a false flow signal from the inlet pressure signal.

79. (New) The mass flow controller of claim 78, wherein the flow meter includes a flow sensor adapted to sense fluid flow in the flow path and adapted to provide a sensor output signal indicative of the sensed fluid flow.

80. (New) The mass flow controller of claim 79, wherein the compensation filter has a transfer function that emulates a response of the flow sensor to fluid flow resulting from changes of the inlet pressure.

81. (New) The mass flow controller of claim 79, wherein the false flow signal is constructed to recreate a false flow information component of the sensor output signal resulting from changes of the inlet pressure.

82. (New) The mass flow controller of claim 81, wherein the flow signal is determined by subtracting the false flow signal from the sensor output signal.

83. (New) The mass flow controller of claim 45, wherein the displacement compensation signal is added to the drive signal to compensate for displacement of the valve caused by the pressure transients.

84. (New) The mass flow controller of claim 83, wherein the flow meter includes a flow sensor adapted to sense fluid flow in the flow path and adapted to provide a sensor output signal indicative of the sensed fluid flow; and

wherein the flow signal is determined by subtracting the false flow signal from the sensor output signal.

85. (New) The mass flow controller of claim 45, wherein the flow meter includes a flow sensor adapted to sense fluid flow in the flow path and adapted to provide a sensor output signal indicative of the sensed fluid flow; and

wherein the flow signal is determined by subtracting the false flow signal from the sensor output signal.